1A.7 MONITORS? APPROVED MONITOR UNDERESTIMATES DIASTOLIC PRESSURE & MISCLASSIFIES PATIENTS

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Background: Health-care providers and clinicians have been urged to consider the advantages of 24-hr ambulatory blood pressure monitors (ABPMs) but must be assured that these devices obtain accurate and reliable information. International, European, and US approval protocols require testing only for subjects who are at rest and seated, yet ABPMs that achieved a passing grade are deemed accurate and reliable for those who are active and assume multiple postures over 24 hr. We questioned whether protocol limitations and postural variations could predispose ABPMs to errors in measuring and classifying patients' blood pressures.

Methods: We developed a novel Dual Monitor Protocol (DMP) with postural challenges to test the accuracy, reliability, and inter-monitor variability of ABPMs. This DMP enabled simultaneous, same arm blood pressure measurements by two trained observers (O1, O2) using a mercury column and teaching stethoscope and two automated devices (A1, A2), and was used to assess pressures in 15 normotensives (8 females, 7 males; age 24±5 yr) and 14 hypertensives (8 females, 6 males; age 50±14 yr) exposed to postural challenges. Pressure differences between observers and a monitor in the lab were used to adjust raw field data obtained in10 hypertensive and 11 primary alcohol-dependent patients (age: 38±9 yr). Subjects recorded time, posture and activities by making checks in a matrix-type log to ensure that appropriate correction factors were made to raw APBM data.

Results: For normotensives in the lab, the monitors underestimated the observers' diastolic pressure (DBP) by ~5 mmHg ($P < 0.001$). DBP common variance for O1, O2 was 95% ($P < 0.01$), while that for A1, A2 was 69% ($P < 0.01$). For 95% of DBP measures, O1, O2 were within±4–5 mmHg, while AI, A2 were within±10–12 mmHg – a difference spanning several JNC categories. The monitors underestimated the observers' DBP progressively from supine (3 mmHg), to seated (4 mmHg), to standing (7 mm Hg) ($P < 0.01$, standing vs other postures). For hypertensives, A1, A2 had a shared DBP variance of 77% and underestimated the observers' DBP by ~4 mmHg. For field measurements in hypertensives, ABPM inaccurately classified seven of 10 hypertensives (70%) underestimating DBP by one to two JNC categories with common errors including: Stage I when Stage II hypertensive and prehypertensive when Stage I hypertensive. For SBP while subjects were asleep, the monitor underestimated the observers' corrected values by ~6 mmHg ($P = 0.001$). For field DBP while subjects were awake, the monitor underestimated the observers' corrected values by approximately 7 mmHg ($P < 0.001$). For 10 of 11 alcohol-dependent patients in the lab, the ABPM incorrectly assessed DBP based on JNC guidelines. The progressive DBP underestimation from supine to seated to standing was most clinically significant for standing (~8–9 mmHg). For 24-hr DBP, the ABPM underestimated the observers' JNC classification of alcohol-dependent patients by at least one category 56% of the time, and misclassified patients as normotensive when prehypertensive, prehypertensive when hypertensive, and optimally normotensive when normotensive.

Summary and Conclusions: Our results confirm that an approved ABPM may underestimate up to 30% of systolic and up to 70% of diastolic pressures by one to two JNC categories. This may lead to misclassification of patients in a clinical setting and misinterpretation of results in research. Our data challenge the results of prior ABPM studies and suggest an urgent need to modify all approval protocols which should require a variety of postural and activity challenges. Additional research should incorporate our DMP to evaluate inter-monitor variability.

1A.8 THE WHITE COAT EFFECT IS ASSOCIATED WITH REDUCED FALL IN NOCTURNAL BLOOD PRESSURE

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Objectives: The absence of a physiological decrease in nocturnal blood pressure (BP) is associated with higher cardiovascular morbidity. It is still not clear why some subjects do not lower their BP at night. We hypothesized that the white-coat effect and BP non-dipping share common more marked white coat effect to be associated with reduced nocturnal BP decrease in African subjects. To confirm our findings in another setting (i.e. Caucasians), we analyzed the association between the white coat effect and nocturnal BP dipping in Switzerland.

Design and Methods: Subjects were randomly selected from participants to the population-based CoLaus study. Ambulatory BP was measured using Diasys Integra devices. Office BP was calculated as the mean of 3 measurements using a validated automatic BP device (Omron HEM 907). White coat effect was defined as the difference between office BP and daytime ambulatory BP. A non-parametric test for trend was used to compare sex-specific tertiles of white coat effect. We used multiple linear regression to adjust for age, sex, body mass index, antihypertensive treatment and urinary sodium and potassium excretion.

Results: The 143 men and 152 women had mean±SD age 56.1±9.8 and 57.2±10.5 years, respectively. The prevalence of hypertension, defined as office BP ⩾140/90 mmHg or being on antihypertensive treatment, was 29% in men and 26% in women, of which 55% and 50% were treated, respectively. The prevalence of non-dipping (N/295) was 33% (97/295) for systolic BP, 37% (109/295) for diastolic BP, and 20% (60/295) for heart rate. The prevalence of white coat hypertension was 7% (22/295). Proportional nocturnal dipping decreased from the lowest to the highest tertile of white coat effect (0.15±0.01, 0.14±0.01 and 0.10±0.01 for systolic BP and 0.15 ± 0.01, 0.13±0.01 and 0.10±0.01 for diastolic BP and 0.23±0.01, 0.17±0.01, 0.14±0.01 for heart rate, respectively, P trend <0.001). In multivariate analyses, each 10-mmHg increase in systolic/diastolic white coat effect was associated with a 1.40±0.55/1.22±0.44 mmHg reduced BP dipping ($P < 0.05$). Findings were similar for heart rate.

Conclusions: There is a marked association between the white-coat effect occurring in the physician's office and reduced nocturnal dipping for both BP and heart rate in Caucasians, which confirms our previous findings in Black Africans. These observations suggest that a similar mechanism, likely via the sympathetic nervous system, could be implicated in the two phenomenons and that the white coat effect might also have prognostic relevance.

1A.9 PREVALENCE OF MASKED AND WHITE COAT HYPERTENSION IN A LARGE 24HR AMBULATORY BLOOD PRESSURE MONITORING POPULATION

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Objective: To define the prevalence of masked hypertension and white coat hypertension in patients presenting for 24hr ambulatory blood pressure monitoring (ABPM).

Design: Data from 15,069 ABPMs performed over a period of 9 years were entered into our database, CARDIOfile. We have confined our analysis to systolic blood pressure (SBP). We compared office SBP with mean 24hr SBP. We defined normotensive as office SBP ⩽140 mmHg or mean 24hr SBP ⩽130 mmHg. Masked hypertension was defined as office SBP ⩽140 mmHg with a mean 24hr SBP of >130 mmHg. White coat hypertension was defined as office SBP >140 mmHg and a mean 24hr SBP of ⩽130 mmHg.

Methods: Data were analyzed using Student's t-test and linear regression analysis. A p value of <0.05 was considered significant.

Results: The mean office and mean 24hr ABPM SBPs (mmHg) for the 15, 069 recordings were, 153.3±18.1 and 132.3±13.7 respectively, ($P < 0.0001$). Using linear regression analysis the r value between the two measurements was 0.67 ($P < 0.0001$). The distribution of results is seen in the table.

Conclusions: The overall prevalence of masked hypertension and white coat hypertension was 3% and 33% respectively. The results are for patients both with and without antihypertensive drug therapy.

Category	N	%
Hypertensive	7,333	48
White coat hypertensive	4,920	33
Normotensive	2,421	16
Masked hypertensive	395	3
Total	15,069	100

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